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A STUDY OF MULTIPLE-METASTATIC ANGIOSARCOMA.

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Cohnheim[6] defines tumor tissue to be an atypical new formation starting in a latent embryonic rudiment. The tumor germs consist of embryonic cells, and it is only when they are favored by external conditions, such as supply of nutriment and their relation to surrounding parts, that they begin to multiply and form a tumor.

Senn[6] says that sarcoma tissue is produced from the matrix of embryonic tissue-cells of congenital or post-natal origin. He describes angiosarcoma as usually of a more or less tuberous structure. Its consistence varies from that of a jelly-like mass to the density of a cartilage. On section the surface presents an alveolar structure, but seldom regularly. In addition there is great vascularity; occasional blood-cysts and hemorrhages impart a variegated appearance. Under the microscope angiosarcoma presents a reticular, seldom alveolar, structure; the cells are arranged in the form of strands corresponding to the bloodvessels. If the vessels do not contain blood the tumor simulates carcinoma. The cells are epithelioid in shape, are normally multinuclear, often show prolongations, and their margins are not as sharply defined from the ground-substance as in carcinoma. The ground-substance is composed of connective tissue in any of its varieties; vessels are numerous, large, and always capillary, and the intercellular tissue is scanty, imparting to the structure an angiomatous appearance. Angiosarcoma is rare, and is most frequently found in the head. The growth of the tumor is slow, but recurrence is rapid. In five out of sixty cases[6] the tumor gave rise to metastasis.

For the diagnosis of neoplasms of the orbit, Swanzy[33] emphasizes the following points: Exophthalmos, palpation, derangement of vision, pain, loss of motility, pulsation, and the consistence of the tumor. Jacqs[33] gives an additional sign—the souffle which is produced by pressure of the ophthalmic artery on the branches of the dilated ophthalmic veins. A diagnosis of orbital tumor is possible only when the growth has reached sufficient development to show a number of the signs above enumerated; and if the primary tumor be of a malignant nature, particularly of the metastatic form, and especially of the angiotic variety, neither a diagnosis nor an operation can be made sufficiently early to insure the life of the patient, as by this time the tumor is too fully developed and has already sent forth its branches or its seeds into other structures or organs, from derangement of which death ensues. Our own experience with these growths, as well as a perusal of the literature, proves to us that sarcoma of the orbit is necessarily fatal, no matter what or how many operations be done to remove the primary focus of the disease.

In a case[41] of metastatic sarcoma originating in the orbit coming under Würdemann's observation the eyeball had been enucleated for "inflammation" three months before by another physician. Neither the patient nor the family were made aware of the malignant nature of the disease until a tumor appeared in the orbit; so the eyeball was probably neither examined nor a diagnosis made. Würdemann removed the entire contents of the orbit. Microscopical examination showed the tumor to be a small, round-celled sarcoma, the cut edges of the optic nerve being infiltrated. Recurrence in the orbit did not take place for three years. About two years after the original operation the liver was found to be enlarged, and, later, metastatic sarcomata appeared in other internal organs of the body and in the skin in different localities, the liver becoming of enormous size, the patient dying of metastatic tumor of the brain three and one-half years after the exenteration.

Dalziel[13] has operated seven times in one case for recurrent sarcoma originating in the orbit, giving rise to secondary growths in the cheek, over the mastoid, in the upper lip, in the superior maxilla, and in the pterygoid processes. The orbital contents were removed four years previously for primary sarcoma of the lachrymal gland. The last operation had been done fifteen months before his report was made, and there had been no recurrence since. Sarcomatous tissue of the small round-celled variety was found. There was no evidence of visceral lesions.

Stirling[32] reports several cases of sarcoma of the orbit, and emphasizes the importance of an early diagnosis and thorough operation, having some of the cases under obervation four and one-half years after the operation in which there is no return of the tumor growth.

Despite favorable reports of this nature, it may be accepted as a truism that if cases of orbital sarcoma be watched long enough the neoplasm will be found to have returned in either the original situation or some other part of the body. Experience and the literature show that if metastasis occurs when the orbit is affected by sarcoma it is usually the visceral organs that become affected. It seems likewise true that, if the orbit be implicated in general metastatic sarcoma, this region is the original place involved, and the disease of other organs is caused through metastasis.

Stirling[32] shows that sarcoma affects both the uveal tract and the orbit in males and females in about equal proportions. The average age in uveal sarcoma is forty-eight and one-half years, and in primary orbital cases the growth first appeared, on the average, at twenty-eight and one-sixth years. There is but little tendency for one side to be affected more frequently than the other. In only four cases out of 103 was there history of tumors in near relatives. In three out of seven cases that recurred there were metastatic growths. Recurrence took place locally from a few weeks to three years after operation. In every case in which recurrence took place the patient died of sarcoma. In the primary orbital cases recurrence was reported to have occurred in 58.6 per cent. The average time elapsing between operation and recurrence was twenty months. Stirling's results show a difference between growths primarily affecting the uveal tract and those beginning in the orbit. In the former 8.86 per cent. recurred in the region of the orbit, and death in 32.9 per cent. was due to metastasis. In the latter, when recurrence took place at all, the orbit was always affected, even when other organs were attacked. Stirling concludes that it is probably less dangerous to have uveal sarcoma than a sarcoma of the orbit.

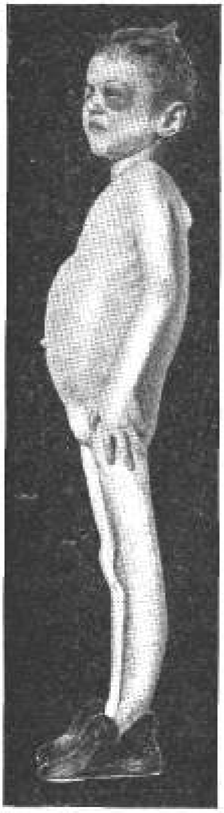
The authors have recently had the opportunity to observe a case of multiple angiosarcoma with wide-spread metastasis and infiltration into various organs. The case was seen in its incipiency, was carefully studied during its entire course, and a complete post-mortem examination of the diseased tissues was made.

J. McG., female, aged five years and seven months, a child of Irish-American parents, was referred to Dr. H. V. Würdemann, October 18, 1897, by Dr. E. J. Kelley, on account of left-sided exophthalmos, due to a tumor in the orbit. The sight on both sides was apparently normal. The left eye, although directed downward and outward, was voluntarily movable in all directions.

Family History. Grandfather on paternal side died of old age. Grandmother still alive. Father's health has always been good. No tubercular or carcinomatous history on his side. Grandfather on maternal side died of cancer of the stomach. Grandmother died in childbirth. Mother's health has been good until recently, when she has suffered from nervous dyspepsia and neurasthenia. Commenced to menstruate at fifteen years of age; she has had eight children; her labors have been easy; one miscarriage occurred at seven months. One child died of malnutrition at less than one year of age; the others are living. One boy, sixteen years old, had spinal meningitis at four years of age, leaving curvature of the spine. One boy, fourteen years of age, had supposed tubercular disease of the knee-joint. The limb is now deformed. The other children are healthy, except the one whose case is here reported.

Personal History. The child was delivered by Dr. S. W. French, the labor being easy; the infant was apparently normal; raised partly by wet nurse and partly by bottle. She had no illness other than usual indispositions of infancy, and was not ill during early childhood up to this time. September 10, 1897, the left eye was observed to be diverging and slightly protruding. The general condition before this time had been good, but about this time she suffered from indigestion, which was followed by malnutrition.

FIG. 1.



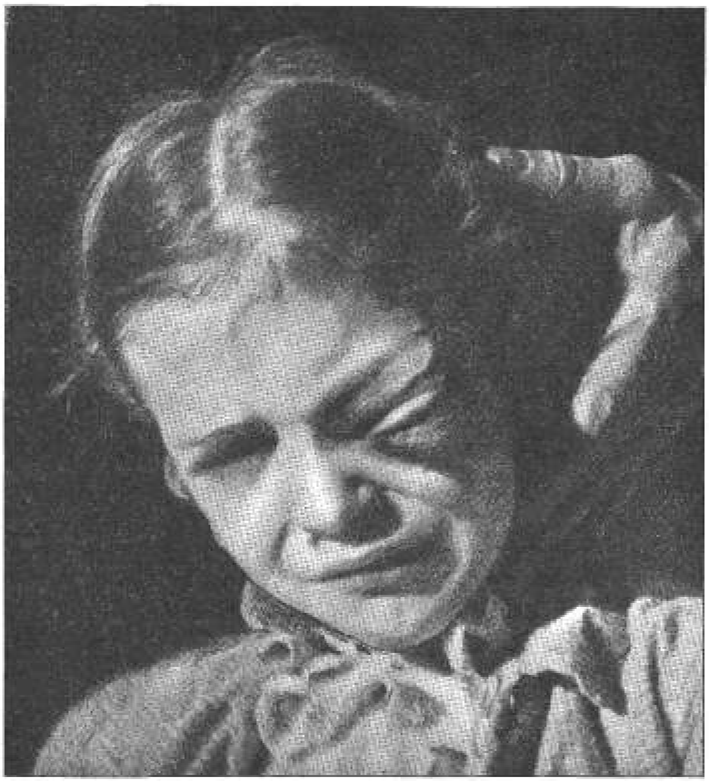
Condition of patient January 1, 1898.

October 18, 1897, she was brought to the office by Dr. E. J. Kelley, he having seen her a few days before. The child weighed about forty pounds, was anæmic and poorly nourished. There was exophthalmos of the left eye, with protrusion downward and outward. An irregular growth was felt, which evidently proceeded from the upper and inner angle of the orbit; this was movable, slightly nodulated, and gave evidence of fluctuation. There was some little ecchymosis of the upper lid. There was a history of indigestion and intestinal trouble during the last month, probably caused by the diet allowed, for when placed in the hospital on a good, wholesome diet this disappeared. Ophthalmoscopic examination showed nothing abnormal beyond congested retinal veins in the left eye. The vision was not obtained, owing to the child's ignorance. General examination by palpation, percussion, and auscultation revealed nothing abnormal.

20*th.* She was taken to the Milwaukee Hospital, and, with the assistance of Drs. E. J. Kelley, N. M. Black, and Edward Schulz, the growth was removed by Dr. H. V. Würdemann under chloroform anæsthesia. An incision was made through the fold of the upper lid, the fibres of the elevator caught with a thread, and reunited after removal of the growth. The tumor seemed to originate from the orbital portion of the frontal bone, was subperiosteal, and extended back and outward from the margin of the orbit about 20 mm. It was of a dark color, cystic, and friable in character, and broke down in the removal. It contained a blackish fluid mingled with débris of degeneration. Denuded bone was exposed by the probe. All of the growth was removed, the surrounding parts curetted, and tube drainage inserted. The wound healed rapidly, and in two weeks the eye regained its normal appearance and position. The exophthalmos and strabismus entirely disappeared. Microscopical examination showed the growth to be a nuclear neoplasm, probably a sarcoma.

December 10th. The child was again brought to the office by Dr. E. J. Kelley, with the eye protruding even more than when first seen, with an enlargement at the left temporal prominence and one in the upper temporal portion of the right parietal bone. The right hypogastrium protruded, and on physical examination a tumor was found in this region, which at the time was believed to be a metastatic growth in the liver. She was reduced in weight, and had a decided cachectic look. Neither eyeball was inflamed, and, as far as we could judge, there were

FIG. 2.



Condition of patient January 1, 1898.

no purely ocular symptoms, except exophthalmos and a bruit, appreciable by the stethoscope when applied over the eye. The vision of both eyes was seemingly the same. Ophthalmoscopic examination was negative in the right eye; in the left tortuosity of retinal veins was seen. No history of diplopia was obtained. An unfavorable prognosis was given, and the parents were told that the tumors were inoperable and advised to send the child to the Milwaukee Children's Hospital. This advice was not followed until December 24th, when Dr. Würdemann was called to the house, where he found the child in a deplorable condition, not having been able to retain any food for nearly a week.

25*th.* The patient was taken to the Milwaukee Children's Hospital. Weight about thirty pounds; pulse 120; temperature 99.6°. She was put upon rectal feeding with peptonized milk, three ounces every four hours, preceded by copious injections of sterilized water. Absolutely no food was given by mouth until December 28th. Pulse decreased to 100; temperature to normal. She was kept in bed for two days; on the 28th, dressed and allowed to sit up. Was most comfortable curled up in a large chair or sitting on haunches on the floor. The mental condition was that of an average child. The weight on December 27th was thirty and one-half pounds. The blood-count showed the proportion of white corpuscles to the red normal, the red being lowered in number (3,500,000); hæmoglobin 80 per cent.; urine normal.

30*th.* Iodide of potash, 0.30 gramme three times a day, in milk, was given and kept up for a month. All nourishment was taken by the mouth, and there was a gradual improvement in appearance and general health, although there was gradual enlargement of the tumors.

January 1, 1898. The temperature varied from 98° to 99.5°; pulse 100 to 120; respirations 25.

3*d.* Muscular cramps appeared in both legs, coming on at intervals during three days, but these gradually disappeared. During the remainder of the month the patient was up and dressed. Complained of no pain or irritation from the light, and could see with the affected eye. Noticed everything going on around her; sat in same position above mentioned; had a good appetite, being on general diet.

February 10*th.* Her weight was thirty-two pounds, the increase in weight being largely due to the increase of the abdominal tumor. The abdomen was very much distended; the arms and legs very thin. She still noticed everything going on about her; played with her dolls, and could walk. She refused solid food, but would take milk and ice-cream in small quantities. Vomited easily, food coming up unchanged. Irritation of skin of abdomen. The left eyeball had been inflamed several days, the vitreous first becoming turbid, then the cornea opaque, and speedily softening, due to lessening of the nutrition from pressure of the tumor. From this time on an occlusive dressing, moistened with 25 per cent. glycerin solution, was kept on the eye.

12*th.* Was much weaker, remaining in bed. Most comfortable when lying on the left side, curled up, with the head nearly to the knees. Temperature 98° to 99°; pulse gradually increased, 120 to 130. Great increase in tumors.

17*th.* Weight thirty-three and one-quarter pounds, due to increase of abdominal growth.

19*th.* Very much weaker; noticed but little, and refused food.

20*th.* Took food by mouth, eating meat, drinking milk, and playing with dolls. Gradual decrease of vitality. Mental condition unchanged. Pulse regular and steady, 120.

FIG. 3.

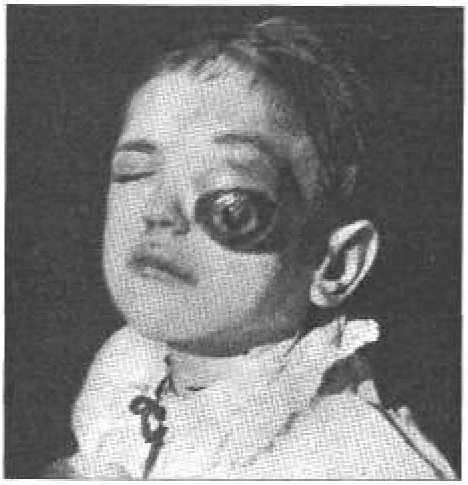
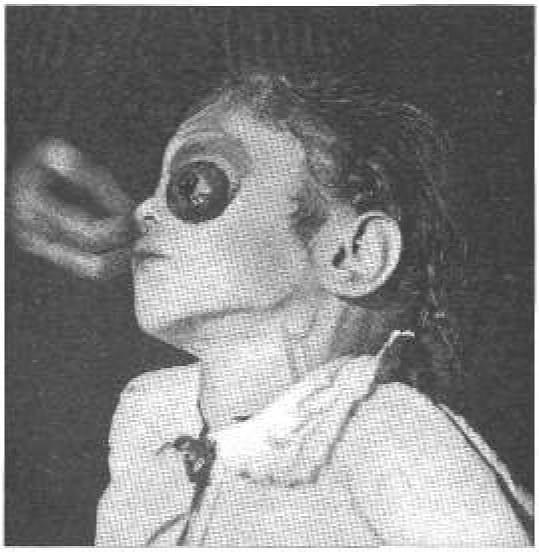


FIG. 4.



Condition of patient February 10, 1898, showing implication of the cervical lymphatic glands.

23*d*. Slept well previous night, no pain, and took nourishment. Mental condition unchanged; asked for milk and bread and to go down-stairs. After a bath was tired, and said she would rather remain in bed. 9.30 A.M. direct change came. Lapsed into unconsciousness, breathed shortly and quickly, with rattling noise in the throat. 10 A.M., breathing more quietly, pulse weaker, convulsive spasms occurred, which gradually grew weaker. Death at 11.45 A.M., February 23, 1898.

FIG. 5.

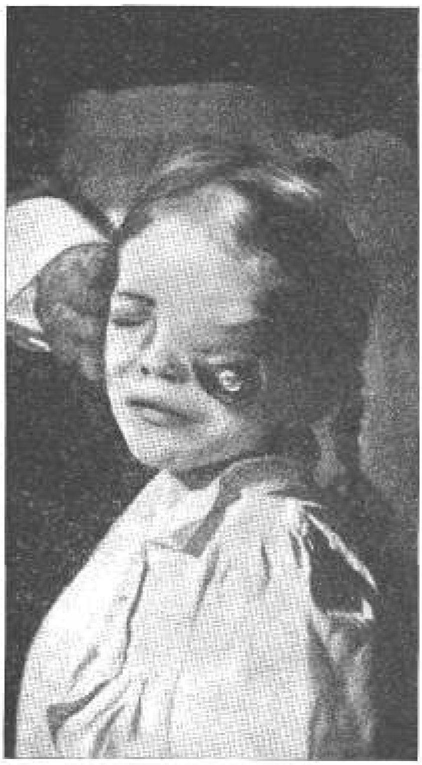
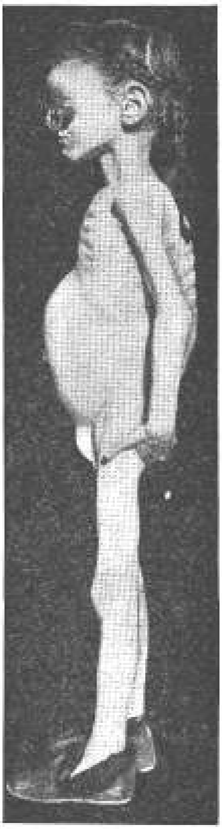


FIG. 6.



Post-mortem Examination. February 23, 1898, at 4 P.M., post-mortem examination was made by Drs. Würdemann and Black. The case being a *cause célèbre,* a number of other physicians were present by invitation.

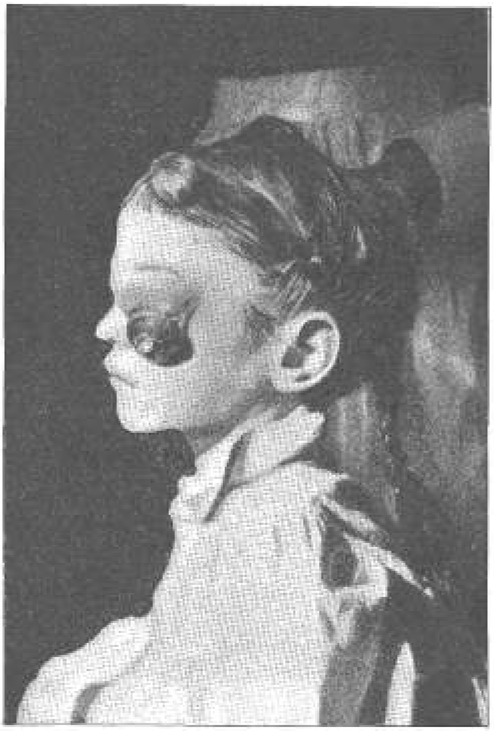
The following report of the pathological appearances has been made by Drs. N. M. Black and S. H. Friend:

External Examination. Female, aged five years, eleven months; height three feet ten inches; weight of body, thirty-five pounds. Post-mortem discolorations on neck and back. Body poorly nourished. The color of skin yellow. The arms and legs as thin as pipe-stems. (Fig. 6.)

Head. A tumor the size of an egg on the left frontal prominence. Tumor about the size of an orange on right parietal bone, near the superior junction of the parietal and frontal bones. The left eye is pushed forward by a tumor, the size of a lemon, between the commissure of the lids 5 to 8 cm. (Figs. 5 and 7); the bloodvessels deeply injected and ecchymosed; the cornea and conjunctiva broken down. The lids of the right eye are ecchymosed.

Abdomen. Protruding from within the abdomen is a tumor filling a part of the right hypogastrium, the entire epigastrium, almost the entire left hypogastrium; it is about the size of a child's head (Fig. 6) Within the right hypogastrium the tumor extends as high as the fifth rib in the nipple line.

FIG. 7.

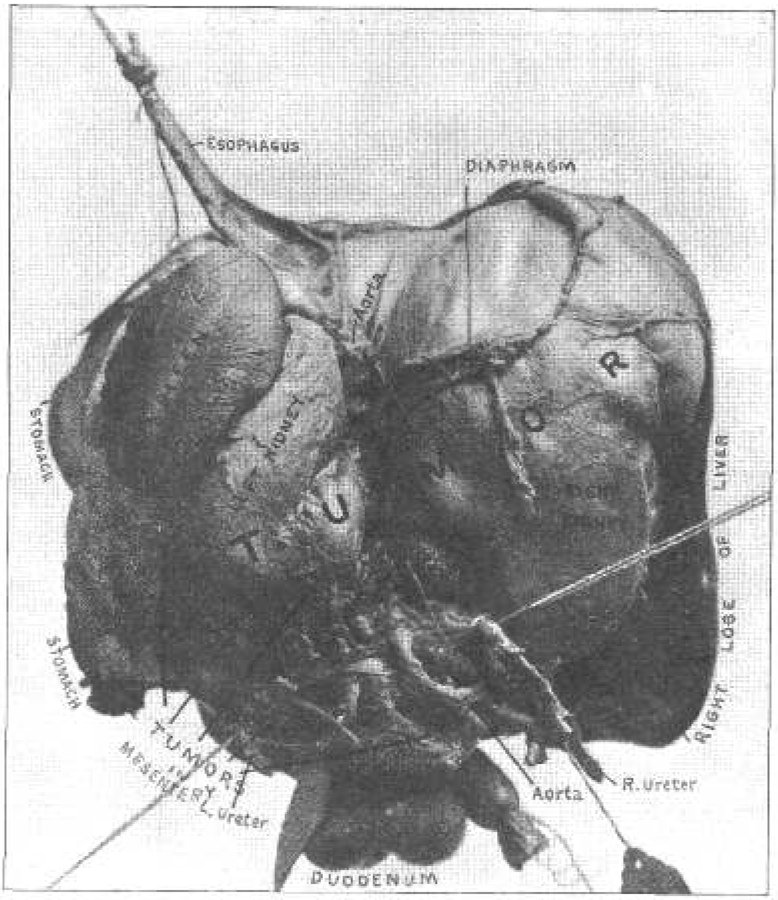


Figs. 5, 6, and 7, show the condition of the patient February 17, 1898.
Figs. 5 and 7 show further development of the orbital and cranial tumors. Fig. 6 markedly shows the enormous increase of the abdominal tumor and the progressive emaciation.

The Thoracic Cavities. The lung, heart, and large bloodvessels show nothing abnormal. The right half of the diaphragm is pushed upward by the growth.

The Abdominal Cavity. The left kidney occupies a normal position; is of a light reddish-brown color. The capsule is non-adherent. Section of the organ shows no abnormality. Weight, seventy grammes. The right kidney lies lower than normal, embedded in an enormous mass of tumor. The tissue surrounding the kidney is firm on pressure and lobulated. The kidney is with difficulty detached from this firm mass. The superior surface of the kidney contains two indented facets produced by pressure of the surrounding growth. The surfaces of these facets are of a reddish-brown color, indicative of blood extravasation. The remainder of the kidney is of a normal color. Weight, sixty grammes. The capsule of this kidney, with the exception of the anterior portion, is involved in the growth.

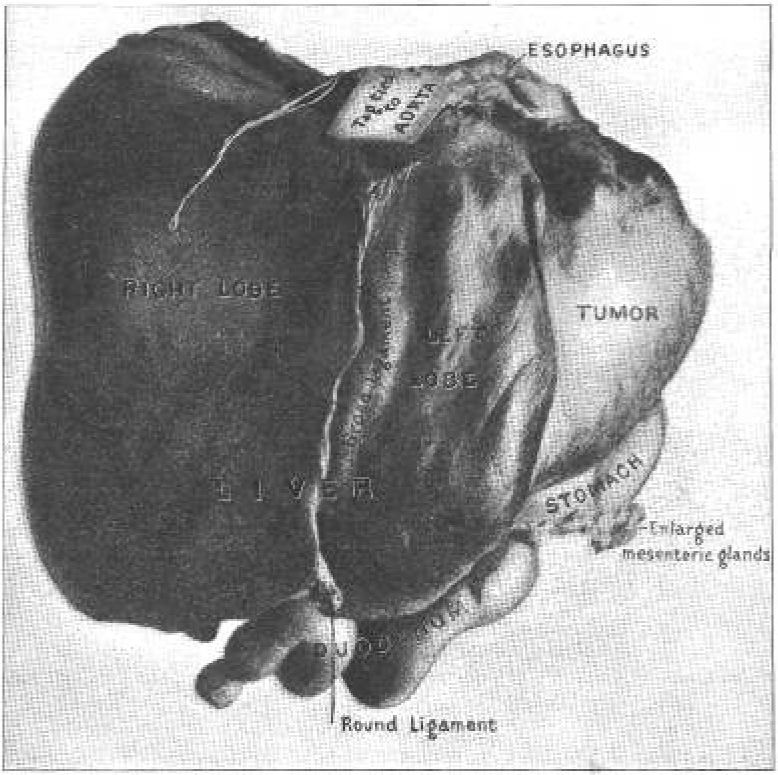
FIG. 8.



Posterior view of abdominal viscera and tumors.

The suprarenal capsule is enlarged to about ten times its normal size and tightly adherent to the neoplasm. In attempting to separate the capsule from the growth the finger entered a cavity from which a chocolate-colored blood fluid oozed. The spleen is pushed upward, yet appears normally attached. The color and consistence of the organ normal. Weight, forty-five grammes. The ilium, jejunum, and large intestines show no abnormalities. The upper border of the transverse colon lies on a level with umbilicus. The mesenteric glands are all enlarged. The pelvic organs are normal. The liver, stomach, duodenum, pancreas, and the neoplasm, with some mesenteric glands and the aorta, massed together. The liver is flattended upward against the diaphragm, pushed by the attached neoplasm. The amount of liver-tissue present is about the size of two adult hands, the outer surfaces pressed together. Its thickest portion measures about 3 cm., and from that depth tapers to 1 cm. at the edges. The weight of the liver, detached, is 450 grammes.

FIG. 9.

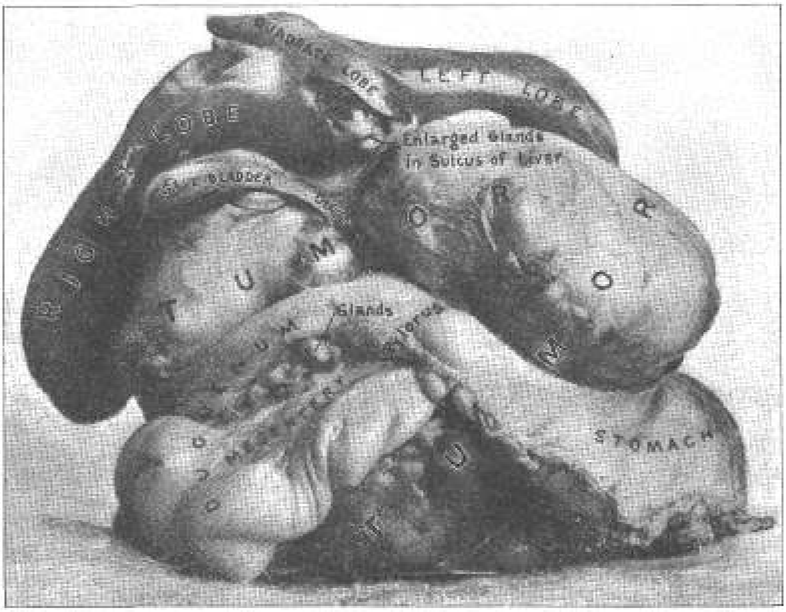


Anterior view of abdominal viscera and tumors.

The main neoplasm, covered by the peritoneum throughout its entire extent, continues into the liver. The entire neoplasm weighs 1660 grammes. The growth throughout the entire extent is lobulated; attached to 4 cm. of the posterior wall of the gall-bladder; to the superior border of the lesser curvature of the stomach; to the mesenteric border of the duodenum, and to the connective tissue surrounding the aorta. The gall-bladder contains a small quantity of grayish-colored fluid. The duct is patulous. A lobule of the neoplasm pushes the gall-bladder upward and to the right. The common duct is elongated and passes around over the anterior portion of the growth between two lobules, to reach the duodenum, and enters at the normal point, 10 cm. from the pyloric end of the stomach. The tissues of the gall-bladder are not involved.

The walls of the stomach and duodenum not thickened. The pancreas lies in its normal position, pressed upon by the neoplasm and enlarged mesenteric glands. The organ, much enlarged, weighs thirty grammes. A cyst containing a whitish semi-fluid is connected with its head.

FIG. 10.



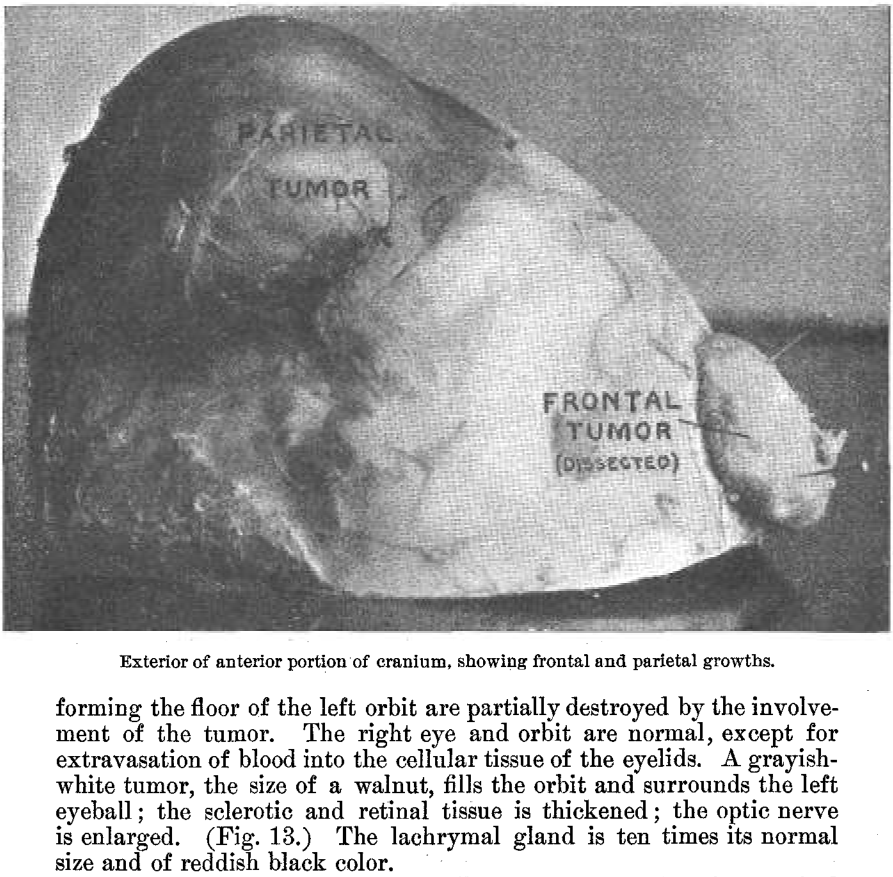
Inferior view of abdominal viscera and tumors.

The Cranial Cavity. On reflecting the scalp from the skull the tumor on the left frontal prominence is found firmly attached to the scalp. The tumor, of a whitish color, is also firmly attached to the bone. The periosteum is destroyed. The tumor on the right parietal bone is of a reddish-brown color, contains blood, and is covered by the periosteum. (Fig. 11.)

The calvarium was removed with difficulty, as firm adhesions were present. Both tumors are attached to the outer surface of the dura. The tumors at the surfaces indicated have destroyed the bone tissue. The outer layer of the dura mater is thickened, and grown to it are parts of the tumors, corresponding to the location of the calvarium tumors. The inner layer of the dura is smooth, glistening, and not involved. (Fig. 12.)

The superior, lateral, and posterior surfaces of the cerebral hemispheres are symmetrical in shape; the convolutions rather large. At the anterior base the gyrus rectus, lobus olfactorius, and gyrus frontalis inferior are destroyed and softened on the left side as far as the fissure of Sylvius and 2.5 cm. into the frontal lobe. The gyrus rectus and lobus olfactorius are pushed aside and partially destroyed on the right side. A tumor is firmly attached to and involves the roof of the left orbit and dura mater. The tumor is of a reddish-black color at the upper parts and a dirty white at the base; it measures 2.5 cm. in height, 6 cm. in length, and 3.5 cm. in width, filling part of the left anterior cranial fossa, and encroaches on the median line, causing the destruction of brain matter above described. Section shows the upper part of the tumor filled with pus and blood. The remainder of the base of the brain is normal. Pia mater is glistening, the vessels not distended; it is destroyed at the base over the tumor on the left side. On section the brain-substance is found to be normal except as noted. The bones forming the floor of the left orbit are partially destroyed by the involvement of the tumor. The right eye and orbit are normal, except for extravasation of blood into the cellular tissue of the eyelids. A grayish-white tumor, the size of a walnut, fills the orbit and surrounds the left eyeball; the sclerotic and retinal tissue is thickened; the optic nerve is enlarged. (Fig. 13.) The lachrymal gland is ten times its normal size and of reddish black color.

FIG. 11.



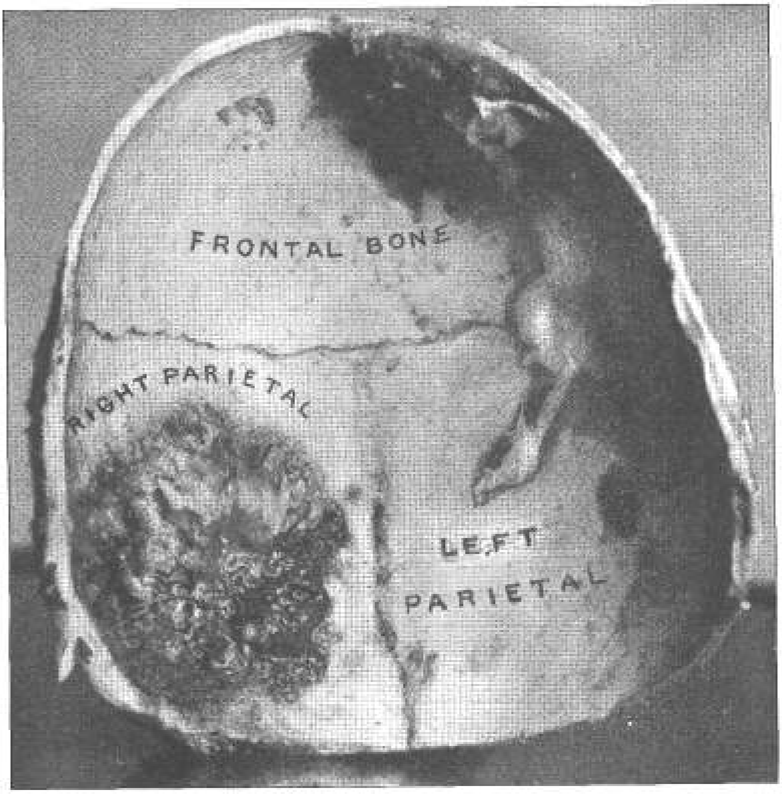
Exterior of anterior portion of cranium, showing frontal and parietal growths.

Microscopical Examination. The following report of the microscopical examination is made by Dr. S. H. Friend:

The tissues were prepared by being hardened in a formalin solution and stained with Bismarck brown. The following sections show a typical small, round-celled nuclear tumor, commonly known as angiosarcoma:

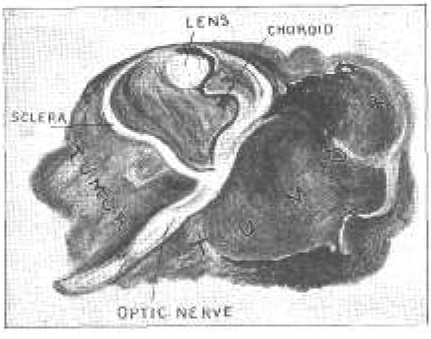
Tumors of the kidneys, liver, orbit, over frontal and parietal prominences and in brain. Kidneys, pancreas, mesenteric glands, and spleen are infiltrated with the nuclear cells. Capsule of the kidney not involved contains the cells. Areolar tissue surrounding the kidney is one

FIG. 12.



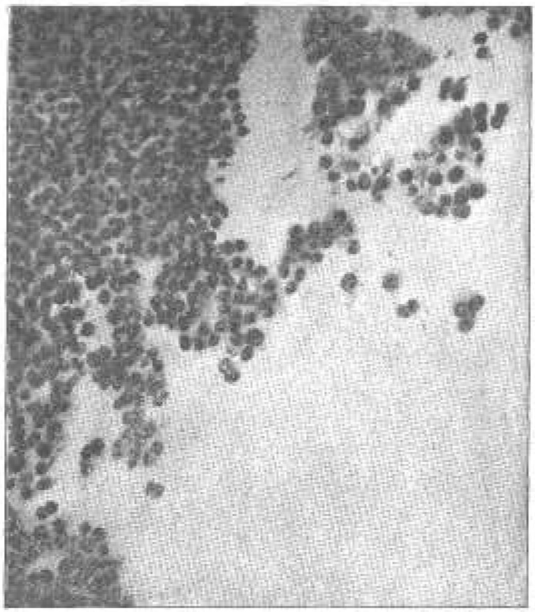
Interior of anterior portion of cranium, showing extensive destruction of bone from infiltration with tumor cells; also localized pachymeningitis.

FIG. 13.



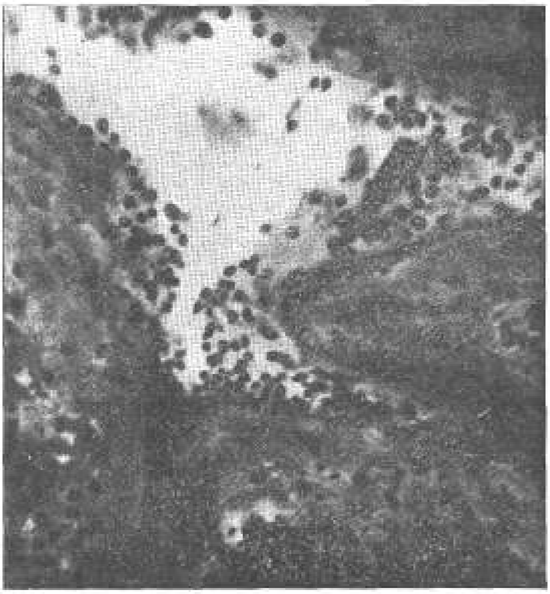
Tumor of orbit enclosing eyeball.

FIG. 14.



Microphotograph of section from orbital tumor. × 160.

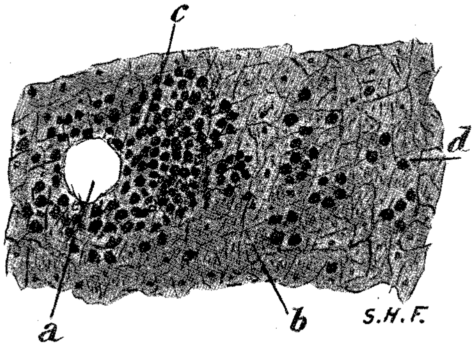
FIG. 15.



Microphotograph of section from large abdominal tumor, showing infiltration of liver. × 160.

sarcomatous mass. Suprarenal capsule infiltrated. Liver shows the gradual destruction of normal tissue by the cells. Tumor of frontal sinus is of the same general character. Sclerotic and retinal tissue is filled with the cells. The optic nerve shows an interesting process: In the fibrous sheath and myelin matter the cells are found in nests and scattered. The tumors on bones of the head are similar to those elsewhere, and the medullary substance of femur and other long bones is infiltrated.

FIG. 16.



Drawing from tissue back of right kidney. × 160.

This illustrates angiotic nature of the neoplasm. a. Artery. b. Cells of surrounding tissue. c. Sarcomatous cells around vessel. *d.* Eccentric sarcomatous cells.

The tumor on the left frontal prominence shows the beginning of the metastatic process. The medullary bone layer is entirely destroyed. Growing from this layer the nuclear cells are pushed outward and inward through both tables of the skull, partly destroying the bone plates.

The growth involves the periosteum and outer layer of the dura mater: (1) by the formation of lymph-glands, and (2) by the infiltration of nuclear cells. The tumors on the parietal bone and the tumor in the kidney particularly show the angiotic character of the neoplasm. (Fig. 16.)

DIAGNOSIS. The clinical evidence and reasoning from the literature of metastatic orbital sarcoma indicate that in our case the sarcomatous tissue originated in the orbit; the metastasis proceeding by means of the bloodvessels, and developing first in those tissues supplied by the portal circulation, the focus of the visceral neoplasm being in the connective tissue back of the right kidney, from which it extended by infiltration and by metastasis into the liver and other organs. The tumors of the frontal and parietal bones and within the cranial cavity were doubtless metastatic and secondary to that of the orbit. The tissues of the surrounding parts became involved through infiltration. The angiomatous nature of the new tissue favored rapid growth and metastasis, and insured the lethal termination. Microscopical examination of many prepared slides shows similar neoplasmic cells, the arrangement of which in certain portions of the tumors show that the growth is an angiosarcoma.

REMARKS. Some of the remarkable clinical points in our case were the fairly good cerebration and absence of paralysis, despite the extensive involvement of the skull and of the brain membranes; the tumor in the right anterior cerebral fossa had completely destroyed the olfactory nerve, and that of the left side of the frontal bone had seriously affected the anterior portion of the left cerebrum; the localized pachymeningitis over the motor area of the right side had given rise to no serious lesion of motility. Such a case as this almost seems to set aside our much-vaunted methods of cerebral localization. The continuance of function of the kidneys, liver, spleen, and other abdominal organs, despite the extensive involvement of other structures and the mechanical impediment to other functions from pressure of the large abdominal tumor, is indeed remarkable.

Morton[24] reports a case of primary sarcoma of the orbit which had some characteristics similar to our case as regards the lesions in the head. There was no history of traumatism; examination showed proptosis; the anterio-posterior axis of the eye was deviated outward and its motility restricted. The cornea was clear, the iris normal, the pupil small, but responsive to stimuli. There was no marked bulbar injection or chemosis. The lids were red and swollen; not much pain, but sense of fulness and discomfort. The growth was rapid and invaded the antrum, nose, ethmoidal and sphenoidal sinuses, nasopharynx, and anterior cerebral fossæ. The eyeball was removed, the patient dying within a few weeks afterward. Post-mortem examination showed that the facial sinuses were infiltrated, the horizontal plates of both superior maxillary bones eaten away; the tongue was invaded, and the entire buccal cavity on the left side was filled; the anterior plate of the antrum cavity was gone; the bony roof of the orbit was eaten away, and the tumor pressed on the frontal lobes of the brain; the tumor mass passed through the post-nasal space into the brain; the liver and other organs were normal. The microscopical examination showed an atypical cartilage rich in cells, irregularly arranged; the cells grouped closely together and mingled with round, mononucleated cells, about the size of white blood-cells. The vessels were numerous, large, and thin-walled, and in some regions the arrangement was cavernous. A diagnosis was made of chondrosarcoma. This description, however, seems to the authors more adapted to angiosarcoma.

Willoughby's case[38] had similar abdominal characteristics to ours, and although there was no orbital involvement, it may be quoted in this relation. In a young adult who had died from multiple sarcomata the necropsy showed the abdominal cavity filled with a number of rounded growths attached to the omentum, mesentery, and peritoneum, many thousand in number, varying in size from small seeds up to one large growth on the gall-bladder, about the size of a cocoanut. There were a few small nodules in the liver, otherwise the growths were confined to the serous membranes and did not extend into the organs. A secondary growth appeared in the scar in one of the paracentesis operations which had been made in the thorax; the pericardium and heart were not implicated. There were secondary growths in the loose tissue over the ribs and above the heart, and the pleuræ were covered with growths. There was slight invasion of the base of the right lung; the diaphragm was covered with growths on each surface. Microscopically the growths consisted of small round-cells. The interesting points in the case were the nearly complete restriction of the growths to the serous membranes. Particularly interesting in relation to our own cases was the non-interference of the growths with the action of the various organs, and hence the absence of many symptoms which might have been expected.

Eshner[14] reports a case of multiple sarcoma in an infant where the kidney was primarily invaded. This was attended by secondary growths in the liver. He states that renal involvement in sarcoma is more common in the first months or years of life, and may be apparent at birth. The tumor is usually unilateral with round or spindle or polymorphous cells.

References to recent literature pertinent to the subject of this article are appended.

RÉSUMÉ. When sarcomatous neoplasms are found in the orbit or adjoining cavities of the head, this region is the primary place involved in the disease, and when metastasis occurs in the abdominal cavity the visceral structures are secondarily affected. These tumors likewise infiltrate the tissues of adjacent regions.

The diagnosis of orbital sarcoma, particularly when attended by metastasis, is usually made too late to save the life of the patient by any operation. When metastasis has occurred, removal of the primary focus or of the secondary growths will not prevent recurrence, although in some instances life may be prolonged. By this time important structures have been implicated through metastasis or infiltration, the involvement of which causes death.

The angiotic form of orbital sarcoma is prone to metastasis, and is fatal from its inception.

BIBLIOGRAPHY.

(Recent literature bearing upon angiosarcoma and multiple-metastatic sarcoma, particularly of the orbit.)

I. ANGIOSARCOMA.

1. Cavazzani, T. Contributo allo Studio dell' Angio-Sarcoma. Rio Veneta di Sci. Med. Venezia, 1897, xxvi, 405–424, 1 pl.

2. Hodenpyl, E. Tubular Angiosarcoma. Proc. New York Path. Soc., 1891–92, p. 21.

3. Kolaczek, J. Ueber das Angio-Sarkom. Leipzig, 1877.

4. Kumberg, I. I. Angio-Sarcoma of the Orbit. Vayenno Med. Journ., St. Petersb., 1898. xxci., med. spec. pt. 39–45.

5. Lucken, F. Ueber Angio-Sarkom. Deutsche Med. Wochenschr., Leipzig, 1891, xxii. 1189.

6. Senn, N. Pathology and Treatment of Tumors.

7. Sventsitski, V. A. Contribution on Angio-Sarcomata. Laitop. russk. Chiv. St, Petersb., 1896, i. 854–856.

8. Von Hippel, R. Beitrag zur Casuistik der Angio-Sarkoms. Beitr. z. path. Anat. u. z. Allg. Path., Jena, 1893, xiv. 370–400, 1 pl.

II. Multiple-metastatic and other Forms of Sarcoma.

9. Bozzolo, C. Sarcomatosi cutanea e Viscerale, diffusa al Cervello. Gior. d. r. accad. di med. di Torino, 1897, 3 s. xiv. 13–16, 1 pl.; also Settimana med. d. Sperimentale Firenze, 1897, li 19–21.

10. Brainerd, I. N. Sarcoma of the Antrum, Orbit, and Neck. Trans. Mich. Med. Soc., Detroit, 1893, vol. xvii. p. 206.

11. Calucci, G. Lymphoe-Sarcoma, bi-laterale dell' Orbita. Giov. d. Ass. Napol. di med. e vat., Napoli, 1898, viii. 107–119.

12. Cohn, I. E. A Case of Multiple Sarcoma. Journ. Cutan. Genito-Urin. Dis., New York, 1892, vol. x. pp. 393–395.

13. Dalziel, T. K. Repeated Operation for Recurrent Sarcoma. Glasgow Med. Journ., 1898, vol. xlix. p. 183.

14. Eshner, A. A. Multiple Sarcoma in an Infant. Phila. Polycl., 1897, vol. vi p. 253.

15. Ewetzky, T. Weitere Studien über intra-ocülare Sarkome. Arch. f. Ophth. Leipzig, 1898, xlv. 563–612.

16. Geraty. Multiple Sarcomatous Tumors. Lancet, London, 1892, vol. i. p. 260.

17. Glaeser, A. Mit recurrirendem Fieber verlaufende multiple Sarkomatose. Allg. med. Central-Ztg. Berl., 1897, lxvi. 601–603.

18. Havas. Zwei Fälle des idiopathischen multiplen Pigment-Sarkom. Pes. med. chiv. Presse. Budapest, 1893, xxix. 250.

19. Jackson, J. I. A Case of Idiopathic Multiple Pigmented Sarcoma (Kaposi type). Brit. Med. Journ., London, 1897, vol. ii. pp. 866–868.

20. Jacobi, M. Multiple Sarcoma. Arch. Pediat., New York, 1893, vol. x. pp. 60–62.

21. Kaposi, M. Sarcomatosis Universalis. Tod. Jahrb. d. Wien. k. k. Krankenanst, 1895. Wien u. Leipzig, 1897. iv. pt. ii. 133.

22. Kobner. Idiopathisches multiples Sarcoma hæmorrhagicum. Verhandl. d. X internat. med. Cong., 1890. Berl., 1891, iv. 13 abth., 39–41.

23. Macdonald, W. G. Four Cases of Sarcoma presenting some Unusual Features. Albany Med. Ann., 1893, vol. xiv. pp. 65–70.

24. Morton, H. McI. Primary Sarcoma of the Orbit. New York Med. Journ., April, 1896.

25. Pischel. Ein Fall von Tumor der Orbite. N. Y. med. Monatschr., 1898, x. 248.

26. Small and Large Round- and Spindle-celled Sarcoma. Proc. New York Path. Soc. (1890) 1891, pp. 67–71.

27. Read, R. H. A Case of Sarcoma. Columbus Med. Journ., 1896, vol. i. pp. 854–856.

28 Ried, T. Pigmented Sarcoma in its Early Stages. Trans. Glasgow Path. and Clin. Soc. (1886–91) 1892, vol. iii. p. 196.

29. Roncali, D. B. Sur l'Existence des Levures Organisées dans les Sarcomes. Ann. de Microg., Paris, 1896, viii. 449–461.

30. Sherwell, S. Multiple Sarcomata. History of a Case showing modification and amelioration of symptoms under large doses of arsenic. The American Journal of the Medical Sciences, Phila, 1892, N. S., vol. civ. pp. 443–449.

31. Start, B. Ueber das Sarkom und seine Metasten. Berlin, 1877.

32. Stirling, A. W. Sarcoma of the Orbit. Ophth. Rec., 1898, vol. vii. pp. 331–336.

33. Swanzy. Diagnosis of Neoplasms of the Orbit.

34. Report of a Case of Multiple Sarcomata in an Infant. Univ. Med. Mag., Phila., 1890–91, vol. iii. pp. 387–393.

35. Webster, D. Sarcoma of the Orbit. Medical News, New York, 1898, vol. lxxii. p. 271.

36. Wietschur, A. Zür klinischen Diagnose des Sarkoms der innere Organe. St. Petersb. Med. Wochenschr., 1892, N. F., ix. 121–125.

37. Whittaker, J. T. Sarcoma: Its Pathology and Treatment. Cincin. Lancet-Clinic, 1897, N. S., vol. xxxix. pp. 517–523.

38. Willoughby, W. G. Case of Multiple Sarcomata, Practically Confined to the Serous Membranes in a Young Adult. Death. Necropsy. Lancet, London, 1896, vol. ii. p. 810.

39. Winocauroff. Zür Lehre von der Sarkomatose; multiples Sarkom der inneren Organe bei einen 12 jährigen Knaben. Arch. f. Kinderh., Stuttgart, 1896, xxi. 203-208.

40. Withington, C. F. Cases of Multiple Sarcoma. Med. and Surg. Rep. City Hosp. Boston, 1892, pp. 201-222.

41. Würdemann, H. V. Illustrative Cases Showing the Indications for Enucleation of the Eyeball with Macroscopic and Microscopic Photographic Illustrations from Specimens. Ann. Ophth., October, 1897.

A CASE OF GLIOMA OF THE LOWER CERVICAL REGION OF THE SPINAL CORD PRODUCING A TOTAL TRANSVERSE LESION, IN WHICH THERE WAS SPASTICITY OF THE LOWER LIMBS AND PERSISTENCE OF THE DEEP REFLEXES.[1]

I. A STUDY OF THE TUMOR AND SOME OF THE PHENOMENA PRODUCED THEREBY.

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II. A STUDY OF A PECULIAR FORM OF DEGENERATION (DEGENERATIO MICANS) MET WITH IN THIS CASE.

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III. SOME POINTS IN THE PATHOLOGY OF SYRINGOMYELIA.

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I.

The patient, who first came under my charge from August to November, 1890, was a man, aged fifty years, whose family and personal history was free from any record of either syphilis or tuberculosis. Six months previously he had been thrown from a horse, striking on his shoulders and neck, and to that injury he attributed his symptoms, which then consisted chiefly of pain along the spine from the dorsal region downward and burning in the legs and feet. The knee-jerks were exaggerated; he swayed when standing with the eyes closed. He grew slowly worse on mixed specific treatment; passed from my care, and I did not see him for six years. During this time he had repeated "dysenteric" attacks, and early lost power in the legs, these members having become almost entirely helpless in 1891 and, finally, completely so in 1895. By this time sensation had become lost as high as the nipple line. He had never had the excruciating pain common in spinal tumor,

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[1] On account of the length of the original contribution it was considered advisable to publish it in this JOURNAL in abstract.

The paper has been published in full in the form of a monograph, which will be sent to those interested in the subject, upon request to Dr. W. H. Hudson, La Fayette, Ala.